

## Appendix A

### SCOPE OF WORK

Extract from Transfund Terms of Reference

# **Terms of Reference**

## **Post Construction Safety Audits 96/97;**

### **Seal Extensions.**

#### **1. INTRODUCTION**

In these post construction safety audits, a project, which has already been built, is examined from its initial conception to final construction and post construction experience. These safety audits are not detailed audits, they are more general overviews. The aim is to discover whether safety was given due consideration at every stage. In this way, common problems can be identified and advice offered to the profession on how to deal with them.

#### **2. BACKGROUND**

Seal extension are done for a variety of reasons: for example: reduce travel time, reduce vehicle operating costs, reduce the nuisance from dust. They are rarely done for safety reasons. There is pressure to seal the unsealed roads, and there is pressure to do it as cheaply as possible. Thus there is the potential for safety to be compromised.

However, safety is not a binary state: safe/unsafe. It is a continuum from less safe to more safe. For this reason, standards are created to state that a particular level of safety is the one on the continuum to aim for. But we operate on a system of economic analysis where the costs and the benefits are estimated and the economic return is maximised, in theory. In practice, this can result in projects being designed to a lesser quality than advocated in the "standards".

There is ad hoc evidence that some seal extensions are causing some considerable safety concerns.

#### **3. PURPOSE OF THE AUDITS**

The purpose of these post construction safety audits is to examine a number of seal extension projects and to determine whether safety was given due consideration during the projects' development and whether the finished works are, subjectively, safe ones.

#### **4. SPONSOR**

Peter Wright, Transfund Review and Audit Manager

## 5. PROJECT MANAGER

Ian Appleton, Transfund Safety Audit Manager

## 6. SCOPE

### 6.1 Staging

The project is envisaged in two parts. The first part is scoping the problem and the second is a detailed audit of selected seal extension projects.

### 6.2 Scoping the problem.

A fairly large sample (say about 30) of recently completed seal extension projects on both state highways and local roads will be drawn from the National Roding Programme (was the NTLP). The detailed design of these selected projects will be requested and examined. It is anticipated that some of these designs will appear straightforward, while others may appear inherently difficult to achieve a satisfactory safety outcome, for whatever reason.

From this large sample, a smaller sample (say about 10) will be selected to include those projects which, from the examination of the designs, appear to be difficult to achieve a satisfactory safety outcome. This smaller sample will be subjected to the full post construction safety audit.

### 6.3 Post construction safety outcome

The project manager recognises that it is not possible to measure with any degree of certainty, the safety benefits of a particular work until 5 years after its construction. As part of the audit is concerned with the process of investigation and design, auditing projects constructed over 5 year ago is not especially useful. Therefore a balance has been struck by choosing more recent projects and sacrificing the ability to determine with any certainty, the actual safety benefits achieved.

### 6.4 Extent of the safety audit

The audits are safety audit. They are not:-

- a financial audit,
- an audit of the benefit cost evaluation; nor
- a technical audit.

The project manager recognises that the boundary between safety and technical is fuzzy. Should the auditor find any significant failure to comply with Transfund policy or a material technical issue which is not a safety issue, then the project manager shall be informed. The project sponsor may request that the scope of that particular audit be widened. The terms of reference and the fee can be renegotiated.

The audits shall look at three stages akin to the stages 2, 3 and 4 in Transit New Zealand's Safety Audit Policy and Procedures. These are:

- Stage 2: Scheme Assessment
- Stage 3: Detailed Design
- Stage 4: Completed Works.

However, these post construction safety audits are not detailed safety audits, they are more a general overview. If a formal safety audit has been conducted, then the audit reports should be requested and reviewed.

#### 6.5 Scheme Assessment.

The main document is the scheme assessment used to justify the project. The audit should concentrate on the safety aspects. The questions to be considered should include, but need not necessarily be limited to:-

- Were the safety problems clearly identified?
- Was the solution proposed a good solution?
- Were the benefits and / or disbenefits claimed in relation to safety of the right order?

#### 6.6 Detailed Design

The main document here is the design drawings used to construct the works. This will have been examined during the course of the scoping part. The questions to be considered should include, but need not necessarily be limited to:-

- Does the design accurately reflect the solution proposed in the scheme assessment?
- Does the design comply with current standards and guidelines?
- Does the final design contain any features which are inherently unsafe?

## 6.7 Completed Work

Here the evidence is the completed work. The questions to be considered should include, but need not necessarily be limited to:-

- Has the design been translated accurately into the finished works?
- Does the finished product have any features which are inherently unsafe?
- Is there any evidence, objective or subjective, to indicate whether the final works is as safe as practical?

## 7. INTENDED OUTPUTS

There will be two reports, one after each part defined in paragraph 6.1 above.

The report after the first (scoping) part shall be reviewed by the project manager and project sponsor to determine whether the project shall proceed to the second part.

The report of the detailed audits may contain recommendations about improvements to the individual works themselves; the design and construction of seal extensions in general; or any other matter relevant to the safety outcome of seal extension projects.

The two reports shall be for the project manager, in the first instance. The project manager shall make the reports available to the road controlling authorities whose projects were audited. The project sponsor shall choose whether to submit either reports or both to the Transfund New Zealand Board with a covering submission.

## 8. TASKS

### 8.1 The Safety Audit Manager's tasks

#### 8.1.1 The scoping part

- Advise all road controlling authorities of the intention to conduct the audits;
- Appoint the consultant or consultants;
- Choose the projects to be sampled in consultation with the consultant(s);

- Receive the consultant's report and decide on how to proceed to the next part;

#### 8.1.2 Post construction safety audits

- Choose the sub set of the sample to be submitted for post construction safety audits, in consultation with the consultant;
- Advise the selected road controlling authorities of the intention to conduct the post construction safety audits;
- Attend the introductory meeting of the consultant with the selected road controlling authorities, if deemed necessary;
- Undertake the tasks described in the section on the reporting procedure below;
- Review the consultant's draft report;
- Consider suitable publication and dissemination, if any;

### 8.2 The Consultant's tasks

#### 8.2.1 The scoping part.

- Assist the project manager select the sample of seal extensions;
- Write to or otherwise contact the selected road controlling authorities requesting the detailed designs for the sample of seal extensions;
- Decide and document what features of a seal extensions might give cause for concern in respect of road safety;
- Essentially conduct a "desk" stage 3 safety audit on these detailed designs and using the features documented above, determine which projects should be submitted for the post construction safety audit;
- Write a brief report documenting the work done and make recommendations on which projects should be submitted for the post construction safety audit, and any other road safety matter pertaining to seal extensions apparent in the sample;
- Provide a short progress letter for the project manager on the last working day of each month.

### 8.2.2 Post Construction safety audits.

- Write to or otherwise contact the selected road controlling authorities to arrange a personal visit, requesting access to full documentation about the project;
- Request accident data from the LTSA;
- Visit the road controlling authority with the project manager (if possible), interview the relevant personnel; get additional information as necessary;
- Inspect the completed site during hours of daylight and darkness (if practical) taking any measurements and photographs as necessary;
- Inform the project manager in the event that a material technical issue or significant failure to comply with Transfund New Zealand policy is identified.
- Collate the results of the audits into one report, as described in paragraph 7;
- Provide a short progress letter for the project manager on the last working day of each month.

## Appendix B

### SCHEME ASSESSMENT REQUIREMENTS SCOPE OF WORK

#### ***Project Description***

- *Project Location/Length.*
- *AADT/Strategic importance.*
- *Purpose for sealing.*
- *Geotechnical nature of region.*
- *Typical climatic conditions.*

#### ***Traffic***

- *The current traffic count.*
- *Location of the count station or basis of count used.*
- *Percentage heavy commercial vehicles.*
- *Traffic growth rate and any trends.*
- *Present user types and any future changes to user types*

#### ***Design Standards***

- *Details of horizontal and vertical design speed.*
- *Seal and lane widths/extra widening*
- *Sight distance/ passing opportunities.*
- *Road marking/delineation/signage*
- *Intersection details*
- *Side protection/guard railing*

#### ***Summary of Options Considered***

#### ***PEM Economic Evaluation***

- *Reported traffic accidents (Police) 5 or 10 years*
- *Locally reported accidents*
- *Historic maintenance costs*
- *Existing roughness*
- *Traffic growth rate*
- *Existing travel time*
- *Traffic composition*



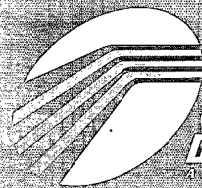
***Land Purchase /Resource Consent Issues***

*A plan showing the existing land boundaries and the impact of the proposed works and to what extent. A summary identifying the effected landowners, various consents required, any problems likely to be encountered.*

## Appendix C

### BIBLIOGRAPHY

- (1) Land Transport Safety Authority Road and Traffic Standards 5 'Guidelines for Rural Road Marking and Delineation' (1992)
- (2) Transfund Standards and Guidelines Manual TFM1 (1997)
- (3) Transfund Project Evaluation Manual PFM2 (1997).
- (4) AUSTROADS Guideline 'Rural Road Design - Guide to the Geometric Design of Rural Roads' (1989)
- (5) National Roads Board 'Geometric Standards for Rural Roads' (1985)
- (6) Land Transport Safety Authority/Transit 'Manual of Traffic Signs and Markings'



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